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ABSTRACT

The authors describe their experience over the last 4 years at Seneca College of Applied Arts and Technology, enhancing the vocational opportunities for at risk students through the use of Reading and Writing Technology, primarily, Microsoft's word processor, Word and WordQ, a word prediction and text to speech software designed to assist learning impaired students with reading and writing. (Author)

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Enhancing Vocational Preparedness for At Risk Students through Technology Enhanced Learning Using Reading/Writing Technology

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The College Vocational Program (CVP), at Seneca College of Applied Arts and Technology, facilitates the development of social, academic, and vocational skills of learning impaired young adults. Each year 50 students participate in a variety of courses designed to develop these skills. Strong self-esteem and self-advocacy skills are stressed. The program includes ongoing assessment of skills and individual counselling. Plans and strategies are developed with the goal of overcoming the numerous barriers that such students may encounter. The goal upon completion of the program is for students to have developed necessary skills to cope effectively and successfully in the community and at work.

Technology is employed as an integrated support to all academic and work-related goals of students. Students use both high and low-tech technologies to help them achieve these goals. Students are evaluated for writing or learning aids such as AlphaSmarts, tape recorders, organizers, calculators, FM systems, and software such as Microsoft's word processor, Word, and WordQ, word prediction and text to speech software.

Students attend computer classes 4 times weekly. This translates into 6 hours per week, for a total of 25 weeks of academic instruction. The classes are an adaptation of the Microcomputer Applications course, a required course for all students attending the college. In addition, the writing portion of the third semester practical English class takes place in the computer lab with students employing the computer and adaptive technology skills they have learned in the first 2 semesters.

Students are instructed in Microsoft Word. Various skills are emphasized such as cut and paste, thesaurus functions, auto-correct, spell and grammar check, and use of wizards, and templates to prepare documents relevant to employment. These documents include resumes, covering letters, references, etc. They receive instruction on how to use combinations of WordQ and Microsoft Word, and online/electronic dictionaries to assist with reading comprehension and writing. Simulation programs allow students to explore job skills involving data entry and cash registers/making change. Students are taught to use the Internet employing Netscape and Internet Explorer, have active email accounts, and produce a personal web page for work-related, self-promotional purposes.

The use of Microsoft Word and WordQ is an integral part of the computer lab classes. The remainder of this paper discusses our experience with this software.

Microsoft Word

Microsoft Word is taught to students, as it is the word-processing software used at our institution. It is our impression that any word-processing software would be of equal value.

The first part of the first semester of the program involves intense instruction and practice with the Windows operating system to ensure that students have a basic understanding of the terminology and the look or feel of a Windows-based program. We do "Windows Aerobics," where students are put through exercises in identifying the items on the standard desktop and the Windows controls related to manipulating those types of programs.

In Microsoft Word the students learn to use the Spell and Grammar check strictly by using the right click mouse button. They use the Thesaurus in the same manner. We have found the complexity of using the full spell check tool resulted in confusion for some students and was cognitively too demanding for others. Students are taught Find and Replace, Abbreviation expansion, Templates and Wizards.

WordQ

WordQ is a reading and writing tool for people of all ages and levels of ability, those who are learning English as a second language and those who have learning difficulties. It is used along with standard Windows word processors and other applications. State-of-the-art word prediction suggests words for the student to use and text-to-speech feedback provides helpful cues. WordQ continuously presents a word prediction list of correctly spelled words as the student types. When students see the word they want to use, they can choose it with a single keystroke or with the mouse. Another keystroke allows them to display a word with its different endings. This helps students who are often unsure of how to produce the plural, "ed" or "ing" endings or other forms of the root words they wish to use. The software can read aloud the list of words to the student.

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The program learns what the student writes. It adapts and updates the student's dictionary each time it is used. Words that are predicted are the words that the student regularly uses and understands. This reduces confusion and speeds the recognition and writing process.

Students can also create and use groups of words called, "Topics" which contains words that are more likely to occur in a word prediction list. For example a student can load the "Sports" topic and the words predicted will focus on the topic of sports. Another topic might be words related to career or vocational concerns.

Along with the word prediction feature of the software one of the most useful aspects of this type of software is the combination of visual and auditory feedback. This provides cues to help the student make choices and to self-detect mistakes. The feedback allows students to use their general language sense and auditory skills to catch errors in grammar, word usage, spelling and punctuation that might otherwise go unrecognized. Letter echo confirms typing a character. Word echo helps detect spelling errors and confirms selection of a predicted word. Sentence echo helps students hear the word flow in a sentence to decide whether the right words and punctuation are used. A special text-reading mode helps with proofreading. Words are highlighted as they are spoken in Microsoft Word, WordPad, Notepad or Outlook.

Integration of Microsoft Word and WordQ Software

Each student in our program is assigned a computer so that they may develop a personal dictionary of words that they use. We help each student add their idiosyncratic items to this dictionary such as their street name, former schools, places of work, email services, and other often used website addresses. We also help them add the name of the College and their program, unusual spellings of professors' names, etc. We try to anticipate and make this dictionary of words as helpful as possible. As students write they see the software respond with the words that they require which allows the students to use these words in their writing. This is writing support exactly when they need it. This appears to be very reinforcing and encourages the students to continuing using the program. Nothing succeeds like success!

Each day we present a topic of general interest and have the students write on that topic in a Journal file. Teachers circulate as students write, providing encouragement, support, and technical assistance. We emphasize that we are not looking for the next great novel, but that we want them to express themselves and practice using the Microsoft Word and WordQ software. This Journal activity takes about 10 - 12 minutes of each class. Following the Journal assignment, instruction encompasses job searches, resume writing, cover letters, e-mail, etc. Every assignment or activity in the class is supported or executed with the assistance of the WordQ software. Requests for spelling assistance are met with, "Have you used your WordQ?", "Try the first 3 letters of the word.", "Do you see it on your list?", "If you're not sure listen to the words on your list."
By the end of the first semester requests for spelling assistance usually sound like, "How do you spell … Oh never mind, got it."

Why Word-Processing and Word Prediction/text to Speech Software?

While technology alone cannot eliminate writing and reading difficulties of students it can enhance their performance. MacArthur states that technological tools can make writing easier as well as more motivating for students with LD (MacArthur, 1999,15:169-192). Unfortunately, many students who might benefit from the use of technologies to assist their literacy levels are uninformed. We frequently encounter the response from students, "Where has this program been all my life?" or "I didn't know you could do that with a word-processor?" Some seem to be embarrassed to use such technology saying, "I don't need any help." These comments often come from fast typists who are extremely poor spellers and are auditory learners. We find that even these fast typists and the good spellers will use the WordQ program as a check when they get to a more difficult word. We require everyone to learn and run the program as they write and read.

Some students expect technologies to be a cure-all for their difficulties. A spell checker in a word processing program will not eliminate spelling errors. In fact, students with LD only correct about half of their errors when

using such devices (MacArthur, 1996, 29:344-354). Our experience would indicate that the auditory feedback function greatly increases the rate of error correction.

These students also approach many writing tasks with fear and loathing. Richards lists the following issues that students report with writing:

- They have a hard time getting started and feel overwhelmed by the task.
- They need to concentrate to form letters: it is not an automatic process.
- They struggle to organize and use mechanics of writing.
- They are slow and inefficient in retrieving the right word(s) to express an idea.
- They struggle to develop their ideas fluently (poor ideation).
- They struggle to keep track of their thoughts while also getting them down on paper.
- They feel that the process of writing on paper is slow and tedious.
- They feel that the paper never turns out the way they want.
- They realize that the paper is still sloppy even though substantial time and effort were spent.
- They are dysgraphic, which causes multiple struggles at the basic processing levels.
- They are dyslexic, which causes very poor spelling and interferes with automatic use of writing mechanics (Richards, 1999).

The final task that we teach our students once they have learned the features of Microsoft Word and WordQ is to use those features to proofread their documents before sending them out. Use of the spell and grammar check coupled with the auditory feedback feature allows students to produce writing that is spelled correctly and sounds like it makes sense. Many students find the sentence by sentence auditory review allows them to correct their mistakes and write what they actually meant to say.

We tell our students that they will produce error free e-mail communications with their professors by the end of the first semester. The reader must remember that these are students who in general do not expect to read or communicate in text. They have gone through the Special Education services of their local schools and school boards and they have reached what they see as the apex of their ability to communicate in reading or writing. Our prediction about them producing error free communications by the end of first semester is met with skepticism by many students. Most do succeed, to their own amazement.

If technology, such as Microsoft Word and WordQ, can help such students overcome some of these difficulties in reading or writing or aid in decreasing the stress felt by students when asked to write, then these software programs should be employed. The use of word processing and word-prediction/text to speech software provides students with the tools so as to be able for the first time to participate in tasks, such as e-mail, chat, and gathering information from the Internet. The activities of producing a website, communicating via e-mail and producing their own documents for employment-related activities also bolsters self-esteem. WordQ software provides assistance in performing searches on the Internet by allowing students to quickly read by using listening, to a large volume of information via Job Sites or lists that might have taken them days to research using traditional newspapers or job flyers. It must be emphasized that many of these students do not read or write unless required to do so. They do not communicate in writing with other people. It is not hyperbole or exaggeration to say word-processing and word-prediction and text to speech software opens up new worlds to them. They are able to access the news and information that we take for granted from Internet newspapers, discussion groups, and various sites. They can select and have information read back to them. They can email family and friends or write documents confident that they have chosen correct words through the auditory feedback function, spelled them correctly and sometimes are inspired to use words through the Thesaurus that they might have known but were afraid to attempt without this non-judgmental assistance.

We measure the reading comprehension of our students using the Canadian Adult Achievement Test form B (CAAT) on entrance to our program and 18 months later, 4 months after they have finished the academic portion of the Program. In the past year, we found an increase in reading comprehension on average of 1.5 grade levels (1.5). When we removed the students from our results who had most of their prior schooling in a language other than English, we found that the remaining students had achieved an average increase of 2 full grade levels. This is an increase of 2 full grade levels in reading comprehension for a group of students who regarded themselves to have already plateaued in terms of their academic achievement despite the best efforts of the traditional education system.

This increase was achieved in 6 hours of instruction per week over 25 weeks. They were re-tested over 4 months after finishing the academic portion of the program. We believe that this shows dramatic and lasting gains for an academically at risk group of students in a vital area of their functioning, reading comprehension. This is the 4th year we have replicated these gains in reading comprehension for 4 separate groups of students.

The ability to wrest meaning from the printed word and to communicate that understanding is one of the required foundations of training. Further vocational training or education is made extremely difficult without good reading comprehension. These students have proven that they can improve in that skill if they are given the appropriate tools and instruction.

We have been privileged to be allowed to share the reading comprehension scores on the CAAT obtained by another program in our catchment area that deals with similar students. This program trained their students in English and reading comprehension along with training in use of computers, but did not employ the word prediction and text to speech software. They measured gains in reading comprehension immediately after the end of training in the last week of their program. They found that their students had achieved a gain of about .9 grade level which is less than one half the gain in reading comprehension that we found with our students 4 months after the end of their training.

The next step in our inquiry will involve an investigation of writing. Anecdotally speaking we are seeing great gains in the writing of our students. The following example illustrates the progress our students show.

First sample first week of class: "I also hade troubale to find my way to class. The colloge was coun fusing because the hole building was under counterscation" Second sample at week 24 of academic instruction, same student: "Two years later the Quebec Nordiques were no longer in Quebec because the franchise had move to Denver, Colorado."

For the first time, in 2002-2003 we are in the process of documenting these writing gains. We have taken writing samples both on keyboard and in handwritten form at program entry and we will be making comparisons with samples taken after the students have completed the program. This will allow us to comment on changes in writing in a more systematic and somewhat more objective fashion. Based upon the findings we have observed to date we hope that other researchers will be prompted to conduct more studies utilizing long-term intensive instruction with at risk learners employing this type of technology. We hope other practitioners will be moved to introduce these training concepts into high schools and other post secondary settings so that other at risk students may be able to enjoy the same benefit and achieve the same success that we have seen for our students.

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